buckle or buckles readily accessible to the occupant to permit his easy and rapid removal from the assembly. A Type 3 seat belt assembly shall be provided with a quickly recognizable and easily operated release arrangement, readily accessible to an adult. Buckle release mechanism shall be designed to minimize the possibility of accidental release. A buckle with release mechanism in the latched position shall have only one opening in which the tongue can be inserted on the end of the buckle designed to receive and latch the tongue.

(f) *Attachment hardware.* A seat belt assembly shall include all hardware necessary for installation in a motor vehicle in accordance with SAE Recommended Practice, Motor Vehicle Seat Belt Installations—SAE J800b, published by the Society of Automotive Engineers, 485 Lexington Avenue, New York, N.Y. 10017, except that seat belt assemblies designed for installation in motor vehicles equipped with seat belt anchorages shall not require underfloor hardware, but shall have 7/16–20 UNF–2A, 1/2–13 UNC–2A, or nonthreaded fasteners as required by the particular vehicle. The hardware shall be designed to prevent attaching bolts and other parts becoming disengaged from the vehicle in service. Reinforcing plates or washers furnished for universal floor installations shall be of steel, free from burrs and sharp edges on the peripheral edges adjacent to the vehicle, not less than 0.06 inch or 1.5 millimeter in thickness nor less than 4 square inches or 25 square centimeters in projected area. The distance between any edge of the plate and the edge of the bolt hole shall be at least 0.6 inch or 15 millimeters and any corner shall be rounded to a radius of not less than 0.25 inch or 6 millimeters, or cut at a 45-degree angle along a hypotenuse not less than 0.25 inch or 6 millimeters in length.

(g) *Adjustment.* A Type 1 or Type 2 seat belt assembly shall be capable of snug adjustment by the occupant by a means easily within his reach and easily operable without appreciable interference with the driving process, or shall be provided with an automatic-locking or emergency-locking retractor. A Type 3 seat belt assembly shall be capable of snug adjustment to fit any child capable of sitting upright and weighing not more than 50 pounds or 23 kilograms unless specifically labeled for use with a child in a smaller weight range.

(h) *Seat back retainer.* A Type 3 seat belt assembly designed for attachment to a seat back or for use in a seat with a hinged back shall include a seat back retainer unless such assembly is designed and labeled for use in specific models of motor vehicles in which the vehicle manufacturer has provided other adequate restraint for the seat back.

(i) *Webbing.* The ends of webbing in a seat belt assembly shall be protected or treated to prevent raveling. The end of webbing in a seat belt assembly having a metal-to-metal buckle that is used by the occupant to adjust the size of the assembly shall not pull out of the adjustment hardware at maximum size adjustment. Provision shall be made for essentially unimpeded movement of webbing routed between a seat back and seat cushion and attached to a retractor located behind the seat.

(j) *Strap.* A strap used in a seat belt assembly to sustain restraint forces shall comply with the requirements for webbing in § 9.4, and if the strap is made from a rigid material, it shall comply with applicable requiremnets in §§ 9.4, 9.5, and 9.6.

(k) *Marking.* Each seat belt assembly shall be permanently and legibly marked or labeled with year of manufacture, model, and name or trademark of manufacturer or distributor, or of importer if manufactured outside the United States. A model shall consist of a single combination of webbing having a specific type of fiber weave and construction, and hardware having a specific design. Webbings of various colors may be included under the same model, but webbing of each color shall comply with the requirements for webbing in § 9.4.

(l) *Installation instructions.* A seat belt assembly or retractor shall be accompanied by an instruction sheet providing sufficient information for installing the assembly in a motor vehicle except for a seat belt assembly installed in a motor vehicle by an automobile manufacturer. The installation instructions shall state whether the assembly is for universal installation or for installation only in specifically stated motor vehicles, and shall include at least those items in SAE Recommended Practice, Motor Vehicle Seat Belt Installations—SAE J800b, published by the Society of Automotive Engineers.

(m) *Usage and maintenance instructions.* A seat belt assembly or retractor shall be accompanied by written instructions for the proper use of the assembly, stressing particularly the importance of wearing the assembly snugly and properly located on the body, and on the maintenance of the assembly and periodic inspection of all components. The instructions shall show the proper manner of threading webbing in the hardware of seat belt assemblies in which the webbing is not permanently fastened. Instructions for a nonlocking retractor shall include a caution that the webbing must be fully extended from the retractor during use of the seat belt assembly unless the retractor is attached to the free end of webbing which is not subjected to any tension during restraint of an occupant by the assembly. Instructions for Type 2a shoulder belt shall include a warning that the shoulder belt is not to be used without a lap belt.

(n) *Workmanship.* Seat belt assemblies shall have good workmanship in accordance with good commercial practice.

§ 9.4 Requirements for webbing.

(a) *Width.* The webbing in a seat belt assembly shall be not less in width than the following dimensions when measured under conditions prescribed in § 9.7(a): Type 1 seat belt assembly—1.8 inches or 46 millimeters; Type 2 seat belt assembly—1.8 inches or 46 millimeters; Type 3 seat belt assembly—0.9 inch or 23 millimeters.

(b) *Breaking strength.* The webbing in a seat belt assembly shall have not less than the following breaking strength when tested by the procedures specified in § 9.7(b): Type 1 seat belt assembly—6,000 pounds or 2,720 kilograms; Type 2 seat belt assembly—5,000 pounds or 2,270 kilograms for webbing in pelvic restraint and 4,000 pounds or 1,810 kilograms for webbing in upper torso restraint; Type 3 seat belt assembly—1,500 pounds or 680 kilograms for webbing in pelvic and upper torso restraints, 4,000 pounds or 1,810 kilograms for webbing in seat back retainer and for webbing connecting pelvic and upper torso restraints to attachment hardware when assembly has single webbing connection, or 3,000 pounds or 1,360 kilograms for webbing connecting pelvic and upper torso restraint to attachment hardware when assembly has two or more webbing connections.

(c) *Elongation.* The webbing in a seat belt assembly shall not extend to more than the following elongations when subjected to the specified forces in accordance with the procedure specified in § 9.7(c): Type 1 seat belt assembly—20 percent at 2,500 pounds or 1,130 kilograms; Type 2 seat belt assembly—30 percent at 2,500 pounds or 1,130 kilograms for webbing in pelvic restraint and 40 percent at 2,500 pounds or 1,130 kilograms for webbing in upper torso restraint; Type 3 seat belt assembly—20 percent at 700 pounds or 320 kilograms for webbing in pelvic and upper torso restraints, and 25 percent at 2,500 pounds or 1,130 kilograms for webbing in seat back retainer and for webbing connecting pelvic and upper torso restraints to attachment hardware when assembly has single webbing connection, or 25 percent at 1,800 pounds or 820 kilograms for webbing connecting pelvic and upper torso restraints to attachment hardware when assembly has two or more webbing connections.

(d) *Resistance to abrasion.* The webbing in a seat belt assembly after being subjected to abrasion as specified in § 9.7(d) shall have a breaking strength not less than 75 percent of the strength before abrasion when measured by the procedure specified in § 9.7(b).

(e) *Resistance to light.* The webbing in a seat belt assembly after exposure to the light of a carbon arc and tested by the procedure specified in § 9.7(e) shall have a breaking strength not less than 60 percent of the strength before exposure to the carbon arc and shall have a color retention not less than No. 2 on the Geometric Gray Scale published by the American Association of Textile Chemists and Colorists, Post Office Box 886, Durham, N.C.

(f) *Resistance to micro-organisms.* The webbing in a seat belt assembly after being subjected to micro-organisms and tested by the procedures specified in § 9.7(f) shall have a breaking strength not less than 85 percent of the strength before subjection to micro-organisms.

(g) *Colorfastness to crocking.* The webbing in a seat belt assembly shall not transfer color to a crock cloth either

wet or dry to a greater degree than class 3 on the AATCC Chart for Measuring Transference of Color published by the American Association of Textile Chemists and Colorists, when tested by the procedure specified in § 9.7(g).

(h) *Colorfastness to staining.* The webbing in a seat belt assembly shall not stain to a greater degree than class 3 on the AATCC Chart for Measuring Transference of Color published by the American Association of Textile Chemists and Colorists, when tested by the procedure specified in § 9.7(h).

§ 9.5 Requirements for hardware.

(a) *Corrision resistance.* Attachment hardware of a seat belt assembly after being subjected to the conditions specified in § 9.8(a) shall be free of ferrous corrosion on significant surfaces except for permissible ferrous corrosion at peripheral edges or edges of holes on underfloor reinforcing plates and washers. Alternatively, such hardware at or near the floor shall be protected against corrosion by at least a Type KS electrodeposited coating of nickel, or copper and nickel, and other attachment hardware shall be protected by a Type QS electrodeposited coating of nickel or copper and nickel, in accordance with Tentative Specifications for Electrodeposited Coatings of Nickel and Chromium on Steel, ASTM Designation: A166–61T, published by the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103, but such hardware shall not be racked for electroplating in locations subjected to maximum stresses.

(2) Surfaces of buckles, retractors and metallic parts, other than attachment hardware, of a seat belt assembly after subjection to the conditions specified in § 9.8(a) shall be free of ferrous or nonferrous corrosion which may be transferred, either directly or by means of the webbing, to the occupant or his clothing when the assembly is worn. After test, buckles shall conform to applicable requirements in paragraphs (d) to (g) of this section.

(b) *Temperature resistance.* Plastic or other nonmetallic hardware parts of a seat belt assembly when subjected to the conditions specified in § 9.8(b) shall not warp or otherwise deteriorate to cause the assembly to operate improperly or fail to comply with applicable requirements in this section and § 9.6.

(c) *Attachment hardware.* (1) Eye bolts, shoulder bolts, or other bolts used to secure the pelvic restraint of a seat belt assembly to a motor vehicle shall withstand a force of 9,000 pounds or 4,080 kilograms when tested by the procedure specified in § 9.8(c)(1), except that attachment bolts of a seat belt assembly designed for installation in specific models of motor vehicles in which the ends of two or more seat belt assemblies can not be attached to the vehicle by a single bolt shall have a breaking strength of not less than 5,000 pounds or 2,270 kilograms.

(2) Other attachment hardware designed to receive the ends of two seat belt assemblies shall withstand a tensile force of at least 6,000 pounds or 2,720 kilograms without fracture of any section when tested by the procedure specified in § 9.8(c)(2).

(3) A seat belt assembly having single attachment hooks of the quick-disconnect type for connecting webbing to an eye bolt shall be provided with a retaining latch or keeper which shall not move more than 0.08 inch or 2 millimeters in either the vertical or horizontal direction when tested by the procedure specified in § 9.8(c)(3).

(d) *Buckle release.* (1) The buckle of a Type 1 or Type 2 seat belt assembly shall release when a force of not more than 30 pounds or 14 kilograms is applied, and the buckle of a Type 3 seat belt assembly shall release when a force of not more than 20 pounds or 9 kilograms is applied as prescribed in § 9.8.

(2) A buckle designed for pushbutton application of buckle release force shall have a minimum area of 0.7 square inch or 4.5 square centimeters with a minimum linear dimension of 0.4 inch or 10 millimeters for applying the release force, or a buckle designed for lever application of buckle release force shall permit the insertion of a cylinder 0.4 inch or 10 millimeters in diameter and 1.5 inches or 38 millimeters in length to at least the midpoint of the cylinder along the cylinder's entire length in the actuation portion of the buckle release. A buckle having other design for release shall have adequate access for two or more fingers to actuate release.

(3) A buckle actuated by a pushbutton shall not release under a compressive force of 400 pounds or 180 kilograms applied as prescribed in § 9.8(d) and shall be operable and meet the applicable requirements of § 9.6 upon removal of the compressive force.

(e) *Adjustment force.* The force required to decrease the size of a seat belt assembly shall not exceed 11 pounds or 5 kilograms when measured by the procedure specified in § 9.8(e).

(f) *Tilt-lock adjustment.* The buckle of a seat belt assembly having tilt-lock adjustment shall lock the webbing when tested by the procedure specified in § 9.8(f) at an angle of not less than 30 degrees between the base of the buckle and the anchor webbing.

(g) *Buckle latch.* The buckle latch of a seat belt assembly when tested by the procedure specified in § 9.8(g) shall not fail, nor gall or wear to an extent that normal latching and unlatching is impaired, and a metal-to-metal buckle shall separate when in any position of partial engagement by a force of not more than 5 pounds or 2.3 kilograms.

(h) *Nonlocking retractor.* The webbing of a seat belt assembly shall extend from a nonlocking retractor within 0.25 inch or 6 millimeters of maximum length when a tension is applied as prescribed in § 9.8(h). A nonlocking retractor on upper-torso restraint shall be attached to the nonadjustable end of the assembly, the reel of the retractor shall be easily visible to an occupant while wearing the assembly, and the maximum retraction force shall not exceed 1.1 pounds or 0.5 kilogram in any strap or webbing that contacts the shoulder when measured by the procedure specified in § 9.8(h), unless the retractor is attached to the free end of webbing which is not subjected to any tension during restraint of an occupant by the assembly.

(i) *Automatic-locking retractor.* The webbing of a seat belt assembly equipped with an automatic locking retractor, when tested by the procedure specified in § 9.8(i), shall not move more than 1 inch or 25 millimeters between locking positions of the retractor, and shall be retracted with a force under zero acceleration of not less than 0.6 pound or 0.27 kilogram when attached to pelvic restraint, and not less than 0.45 pound or 0.2 kilogram nor more than 1.1 pounds or 0.5 kilogram in any strap or webbing that contacts the shoulders of an occupant when the retractor is attached to upper torso restraint. An automatic locking retractor attached to upper torso restraint shall not increase the restraint on the occupant of the seat belt assembly during use in a vehicle traveling over rough roads as prescribed in § 9.8(i).

(j) *Emergency-locking retractor.* An emergency-locking retractor used on a Type 1 or Type 2 seat belt assembly, when tested by the procedure specified in § 9.8(j) shall lock before the webbing extends 1 inch or 2.5 centimeters when the retractor is subjected to an acceleration of 0.5 gravity or 5 meters per second per second, and shall exert a retraction force under zero acceleration of not less than 1.5 pounds or 0.7 kilogram when attached to a pelvic restraint, and not less than 0.45 pound or 0.2 kilogram nor more than 1.1 pounds or 0.5 kilogram in any strap or webbing that contacts the shoulder when attached to an upper torso restraint.

(k) *Performance of retractor.* A retractor used on a seat belt assembly after subjection to the tests specified in § 9.8(k) shall comply with applicable requirements in paragraphs (h) to (j) of this section and § 9.6, except that the retraction force shall be not less than 50 percent of its original retraction force.

§ 9.6 Requirements for assembly performance.

(a) *Type 1 seat belt assembly.* The complete seat belt assembly including webbing, straps, buckles, adjustment and attachment hardware, and retractors shall comply with the following requirements when tested by the procedures specified in § 9.9(a):

(1) The assembly loop shall withstand a force of not less than 5,000 pounds or 2,270 kilograms; that is, each structural component of the assembly shall withstand a force or not less than 2,500 pounds or 1,130 kilograms.

(2) The assembly loop shall extend not more than 7 inches or 18 centimeters when subjected to a force of 5,000 pounds or 2,270 kilograms; that is, the length of the assembly between anchorages shall not increase more than 14 inches or 36 centimeters.

(3) Any webbing cut by the hardware during test shall have a breaking strength

at the cut of not less than 4,200 pounds or 1,910 kilograms.

(4) Complete fracture through any solid section of metal attachment hardware shall not occur during test.

(b) *Type 2 seat belt assembly.* The components of a Type 2 seat belt assembly including webbing, straps, buckles, adjustment and attachment hardware, and retractors shall comply with the following requirements when tested by the procedure specified in § 9.9(b):

(1) The structural components in the pelvic restraint shall withstand a force of not less than 2,500 pounds or 1,130 kilograms.

(2) The structural components in the upper torso restraint shall withstand a force of not less than 1,500 pounds or 680 kilograms.

(3) The structural components in the assembly that are common to pelvic and upper torso restraints shall withstand a force of not less than 3,000 pounds or 1,360 kilograms.

(4) The length of the pelvic restraint between anchorages shall not increase more than 20 inches or 50 centimeters when subjected to a force of 2,500 pounds or 1,130 kilograms.

(5) The length of the upper torso restraint between anchorages shall not increase more than 20 inches or 50 centimeters when subjected to a force of 1,500 pounds or 680 kilograms.

(6) Any webbing cut by the hardware during test shall have a breaking strength of not less than 3,500 pounds or 1,590 kilograms at a cut in webbing of the pelvic restraint, or not less than 2,800 pounds or 1,270 kilograms at a cut in webbing of the upper torso restraint.

(7) Complete fracture through any solid section of metal attachment hardware shall not occur during test.

(c) *Type 3 seat belt assembly.* The complete seat belt assembly including webbing, straps, buckles, adjustment and attachment hardware, and retractors shall comply with the following requirements when tested by the procedures specified in § 9.9(c):

(1) The complete assembly shall withstand a force of 2,000 pounds or 900 kilograms.

(2) The complete assembly shall extend not more than 12 inches or 30 centimeters when subjected to a force of 2,000 pounds or 900 kilograms.

(3) Any webbing cut by the hardware during test shall have a breaking strength of not less than 1,050 pounds or 480 kilograms at a cut in webbing of pelvic or upper torso restraints, or not less than 2,800 pounds or 1,270 kilograms at a cut in webbing of seat back retainer or in webbing connecting pelvic and upper torso restraint at attachment hardware.

(4) Complete fracture through any solid section of metal attachment hardware shall not occur during test.

§ 9.7 Test procedures for webbing.

(a) *Width.* The width of webbing from three seat belt assemblies shall be measured after conditioning for at least 24 hours in an atmosphere having relative humidity between 48 and 67 percent and a temperature of 23±2 degrees Celsius of 73.4±3.6 degrees Fahrenheit. The tension during measurement of width shall be not more than 5 pounds or 2 kilograms on webbing from a Type 1 or Type 3 seat belt assembly, and 2,200±100 pounds or 1,000±50 kilograms on webbing from a Type 2 seat assembly. The width of webbing from a Type 2 seat belt assembly may be measured during the breaking strength test described in paragraph (b) of this section.

(b) *Breaking strength.* Webbing from three seat belt assemblies shall be conditioned in accordance with paragraph (a) of this section and tested for breaking strength in a testing machine of suitable capacity verified to have an error of not more than 1 percent in the range of the breaking strength of the webbing by the Tentative Methods of Verification of Testing Machines, ASTM Designation: E4–64, published by the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103. The machine shall be equipped with split drum grips illustrated in Figure 1, having a diameter between 2 and 4 inches or 5 and 10 centimeters. The rate of grip separation shall be between 2 and 4 inches per minute or 5 and 10 centimeters per minute. The distance between the centers of the grips at the start of the test shall be between 4 and 10 inches or 10 and 25 centimeters. After placing the specimen in the grips, the webbing shall be stretched continuously at a uniform rate to failure. Each value shall be not less than the applicable breaking strength requirement in § 9.4(b), but the median value shall be used for determining the retention of breaking strength in paragraphs (d), (e), and (f) of this section.

(c) *Elongation.* Elongation shall be measured during the breaking strength test described in paragraph (b) of this section by the following procedure: A preload between 44 and 55 pounds or 20 and 25 kilograms shall be placed on the webbing mounted in the grips of the testing machine and the needle points of an extensometer, in which the points remain parallel during test, are inserted in the center of the specimen. Initially the points shall be set at a known distance apart between 4 and 8 inches or 10 and 20 centimeters. When the force on the webbing reaches the value specified in § 9.4(c), the increase in separation of the points of the extensometer shall be measured and the percent elongation shall be calculated to the nearest 0.5 percent. Each value shall be not more than the appropriate elongation requirement in § 9.4(c).

(d) *Resistance to abrasion.* The webbing from three seat belt assemblies shall be tested for resistance to abrasion by rubbing over the hexagon bar prescribed in Figure 2 in the following manner: The webbing shall be mounted in the apparatus shown schematically in Figure 2. One end of the webbing (A) shall be attached to a weight (B) which has a mass of 5.2±0.1 pounds or 2.35±0.05 kilograms, except that a mass of 3.3±0.1 pounds or 1.50±0.05 kilograms shall be used for webbing in pelvic and upper torso restraint of Type 3 seat belt assembly. The webbing shall be passed over the two new abrading edges of the hexagon bar (C) and the other end attached to an oscillating drum (D) which has a stroke of 13 inches or 33 centimeters. Suitable guides shall be used to prevent movement of the webbing along the axis of hexagonal bar C. Drum D shall be oscillated for 5,000 strokes or 2,500 cycles at a rate of 60±2 strokes per minute or 30± cycles per minute. The abraded webbing shall be conditioned as prescribed in paragraph (a) of this section and tested for breaking strength by the procedure described in paragraph (b) of this section. The median values for the breaking strengths determined on abraded and unabraded specimens shall be used to calculate the percentage of breaking strength retained.

(e) *Resistance to light.* Webbing at least 20 inches or 50 centimeters in length from three seat belt assemblies shall be suspended vertically on the inside of the specimen rack in a Type E carbon-arc light-exposure apparatus described in recommended Practice for Operation of Light- and Water-Exposure Apparatus (Carbon-Arc Type) for Artificial Weathering Test, ASTM Designation: E42–64, published by the American Society for Testing and Materials. The apparatus shall be operated without water spray at an air temperature of 60±2 degrees Celsius or 140±3.6 degrees Fahrenheit measured at a point 1.0±0.2 inches or 25± millimeters outside the specimen rack and midway in height. The temperature sensing element shall be shielded from radiation. The specimens shall be exposed to the light from the carbon arc for 100 hours and then conditioned as prescribed in paragraph (a) of this section. The colorfastness of the exposed and conditioned specimens shall be determined on the Geometric Gray Scale issued by the American Association of Textile Chemists and Colorists. The breaking strength of the specimens shall be determined by the procedure prescribed in paragraph (b) of this section. The median values for the breaking strengths determined on exposed and unexposed specimens shall be used to calculate the percentage of breaking strength retained.

(f) *Resistance to micro-organisms.* Webbing at least 20 inches or 50 centimeters in length from three seat belt assemblies shall be subjected successively to the procedures prescribed in Section 1C1—Water Leaching, Section 1C2—Volatilization, and Section 1B3—Soil Burial Test of AATCC Tentative Test Method 30—1957T, Fungicides, Evaluation of Textiles; Mildew and Rot Resistance of Textiles, published by American Association of Textile Chemists and Colorists. After soil-burial for a period of 2 weeks, the specimen shall be washed in water, dried and conditioned as prescribed in paragraph (a) of this section. The breaking strengths of the specimens shall be determined by the procedure prescribed in paragraph (b) of this sec-

tion. The median values for the breaking strengths determined on exposed and unexposed specimens shall be used to calculate the percentage of breaking strength retained.

NOTE: This test shall not be required on webbing made from material which is inherently resistant to micro-organisms.

(g) *Colorfastness to crocking.* Webbing from three seat belt assemblies shall be tested by the procedure specified in Standard Test Method 8—1961, Colorfastness to Crocking (Rubbing) published by the American Association of Textile Chemists and Colorists.

(h) *Colorfastness to staining.* Webbing from three seat belt assemblies shall be tested by the procedure specified in Standard Test Method 107—1962, Colorfastness to Water, published by the American Association of Textile Chemists and Colorists, with the following modifications: Distilled water shall be used, perspiration tester shall be used, the drying time in paragraph 4 of procedures shall be 4 hours, and section entitled "Evaluation Method for Staining (3)" shall be used to determine colorfastness to staining on the AATCC Chart for Measuring Transference of Colors.

§ 9.8 Test procedures for hardware.

(a) *Corrosion resistance.* Three seat belt assemblies shall be tested by Standard Method of Salt Spray (Fog) Testing, ASTM Designation: B 117–64, published by the American Society for Testing and Materials. The period of test shall be 50 hours for all attachment hardware at or near the floor, consisting of two periods of 24 hours exposure to salt spray followed by 1 hour drying and 25 hours for all other hardware, consisting of one period of 24 hours exposure to salt spray followed by 1 hour drying. In the salt spray test chamber, the parts from the three assemblies shall be oriented differently, selecting those orientations most likely to develop corrosion on the larger areas. At the end of test, the seat belt assembly shall be washed thoroughly with water to remove the salt. After drying for at least 24 hours under standard laboratory conditions specified in § 9.7(a) attachment hardware shall be examined for ferrous corrosion on significant surfaces, that is, all surfaces that can be contacted by a sphere 0.75 inch or 2 centimeters in diameter, and other hardware shall be examined for ferrous and nonferrous corrosion which may be transferred, either directly or by means of the webbing, to a person or his clothing during use of a seat belt assembly incorporating the hardware.

NOTE: When attachment and other hardware are permanently fastened, by sewing or other means, to the same piece of webbing, separate assemblies shall be used to test the two types of hardware. The test for corrosion resistance shall not be required for attachment hardware made from corrosion-resistant steel containing at least 11.5 percent chromium or for attachment hardware protected with an electrodeposited coating of nickel, or copper and nickel, as prescribed in § 9.5(a). The assembly that has been used to test the corrosion resistance of the buckle shall be used to measure adjustment force, tilt-lock adjustment, and buckle latch in paragraphs (e), (f), and (g), respectively, of this section, assembly performance in § 9.9 and buckle release force in paragraph (d) of this section.

(b) *Temperature resistance.* Three seat belt assemblies having plastic or nonmetallic hardware or having retractors shall be subjected to the conditions prescribed in Procedure IV of Standard Methods of Test for Resistance of Plastics to Accelerated Service Conditions published by the American Society for Testing and Materials, under designation D 756–56. The dimension and weight measurement shall be omitted. Buckles shall be unlatched and retractors shall be fully retracted during conditioning. The hardware parts after conditioning shall be used for all applicable tests in §§ 9.5 and 9.6.

(c) *Attachment hardware.* (1) Attachment bolts used to secure the pelvic restraint of a seat belt assembly to a motor vehicle shall be tested in a manner similar to that shown in Figure 3. The load shall be applied at an angle of 45 degrees to the axis of the bolt through attachment hardware from the seat belt assembly, or through a special fixture which simulates the loading applied by the attachment hardware. The attachment hardware or simulated fixture shall be fastened by the bolt to the anchorage shown in Figure 3, which has a standard $\frac{7}{16}$–20 UNF–2B or $\frac{1}{2}$–13 UNC–2B threaded hole in a hardened steel plate at least 0.4 inch or 1 centimeter in thickness. The bolt shall be installed with 2 full threads exposed from the fully seated position. The appropriate force required by § 9.5(c)(1) shall be applied. A bolt from each of three seat belt assemblies shall be tested.

(2) Attachment hardware, other than bolts, designed to receive the ends of two seat belt assemblies shall be subjected to a tensile force of 6,000 pounds or 2,720 kilograms in a manner simulating use. The hardware shall be examined for fracture after the force is released. Attachment hardware from three seat belt assemblies shall be tested.

(3) Single attachment hook for connecting webbing to any eye bolt shall be tested in the following manner: The hook shall be held rigidly so that the retainer latch or keeper, with cotter pin or other locking device in place, is in a horizontal position as shown in Figure 4. A force of 150±2 pounds or 68±1 kilograms shall be applied vertically as near as possible to the free end of the retainer latch, and the movement of the latch by this force at the point of application shall be measured. The vertical force shall be released, and a force of 150±2 pounds or 68±1 kilograms shall be applied horizontally as near as possible to the free end of the retainer latch. The movement of the latch by this force at the point of load application shall be measured. Alternatively, the hook may be held in other positions, provided the forces are applied and the movements of the latch are measured at the points indicated in Figure 4. A single attachment hook from each of three seat belt assemblies shall be tested.

(d) *Buckle release.* (1) Three seat belt assemblies shall be tested to determine compliance with the maximum buckle release force requirements, following the assembly test in § 9.9. After subjection to the force applicable for the assembly being tested, the force shall be reduced and maintained at 150±10 pounds or 68±4 kilograms on the assembly loop of a Type 1 seat belt assembly, 75±5 pounds or 34±2 kilograms on the components of a Type 2 seat belt assembly, or 45±5 pounds or 20±2 kilograms on a Type 3 seat belt assembly. The buckle release force shall be measured by applying a force on the buckle in a manner and direction typical of that which would be employed by a seat belt occupant. For lever release buckles, the force shall be applied on the centerline of the buckle lever or finger tab in such direction as to produce maximum releasing effect. A hole 0.1 inch or 2.5 millimeters in diameter may be drilled through the buckle tab or lever on the centerline of the lever between 0.12 and 0.13 inch or 3.0 and 3.3 millimeters from its edge, and a small loop of soft wire may be used as the connecting link between the buckle tab or lever and the force measuring device.

(2) The area for application of release force on pushbutton actuated buckle shall be measured to the nearest 0.05 square inch or 0.3 square centimeter. The cylinder specified in § 9.5(d) shall be inserted in the actuation portion of a lever release buckle for determination of compliance with the requirement. A buckle with other release actuation shall be examined for access of release by fingers.

(3) A buckle having pushbutton actuation of buckle release shall be subjected to a compression force of 400 pounds or 180 kilograms applied at the center of the pushbutton opening through a cylindrical bar 0.75 inch or 2 centimeters in diameter and curved to a radius of 6 inches or 15 centimeters. The bar shall be placed across the center of the pushbutton opening parallel to the direction of the webbing. The buckle shall be engaged and a tensile force of 75 pounds or 34 kilograms shall be applied to the connected webbing during the application of the compression force. Buckles from three seat belt assemblies shall be tested to determine compliance with § 9.5(d).

(e) *Adjustment force.* Three seat belt assemblies shall be tested for adjustment force on the webbing at the buckle, or other manual adjusting device normally used to adjust the size of the assembly. With no load on the anchor end, the webbing shall be drawn through the adjusting device at a rate of 20±2 inches per minute or 50±5 centimeters per minute and the maximum force shall be measured to the nearest 0.25 pound or 0.1 kilogram after the first 1.0 inch or 25 millimeters of webbing movement. The webbing shall be precycled 10 times prior to measurement.

(f) *Tilt-lock adjustment.* This test shall be made on buckles or other manual adjusting devices having tilt-lock adjust-

ment normally used to adjust the size of the assembly. Three buckles or devices shall be tested. The base of the adjustment mechanism and the anchor end of the webbing shall be oriented in planes normal to each other. The webbing shall be drawn through the adjustment mechanism in a direction to increase belt length at a rate of 20±2 inches per minute or 50±5 centimers per minute while the plane of the base is slowly rotated in a direction to lock the webbing. Rotation shall be stopped when the webbing locks, but the pull on the webbing shall be continued until there is a resistance of at least 20 pounds or 9 kilograms. The locking angle between the anchor end of the webbing and the base of the adjustment mechanism shall be measured to the nearest degree. The webbing shall be precycled 10 times prior to measurement.

(g) *Buckle latch.* The buckles from three seat belt assemblies shall be opened fully and closed at least 10 times. Then the buckles shall be clamped or firmly held against a flat surface so as to permit normal movement of buckle parts, but with the metal mating plate (metal-to-metal buckles) or webbing and (metal-to-webbing buckles) withdrawn from the buckle. The release mechanism shall be moved 200 times through the maximum possible travel against its stop with a force of 30±3 pounds or 14±1 kilograms at a rate not to exceed 30 cycles per minute. The buckle shall be examined to determine compliance with the performance requirements of § 9.5(g). A metal-to-metal buckle shall be examined to determine whether partial engagement is possible by means of any technique representative of actual use. If partial engagement is possible, the maximum force of separation when in such partial engagement shall be determined.

(h) *Nonlocking retractor.* After the retractor is cycled 10 times by full extension and retraction of the webbing, the retractor and webbing shall be suspended vertically and a force of 4 pounds or 1.8 kilograms shall be applied to extend the webbing from the retractor. The force shall be reduced to 3 pounds or 1.4 kilograms when attached to a pelvic restraint, or to 1.1 pounds or 0.5 kilograms per strap or webbing that contacts the shoulder of an occupant when retractor is attached to an upper torso restraint. The residual extension of the webbing shall be measured by manual rotation of the retractor drum or by disengaging the retraction mechanism. Measurements shall be made on three retractors. The location of the retractor attached to upper torso restraint shall be examined for visibility of reel during use of seat belt assembly in a vehicle.

NOTE: This test shall not be required on a nonlocking retractor attached to the free-end of webbing which is not subjected to any tension during restraint of an occupant by the assembly.

(i) *Automatic-locking retractor.* Three retractors shall be tested in a manner to permit the retraction force to be determined exclusive of the gravitational forces on hardware or webbing being retracted. The webbing shall be fully extended from the retractor. While the webbing is being retracted, the average force of retraction within plus or minus 2 inches or 5 centimeters of 75 percent extension (25 percent retraction) shall be determined and the webbing movement between adjacent locking segments shall be measured in the same region of extension. A seat belt assembly with automatic locking retractor in upper torso restraint shall be tested in a vehicle in a manner prescribed by the installation and usage instructions. The retraction force on the occupant of the seat belt assembly shall be determined before and after traveling for 10 minutes at a speed of 15 miles per hour or 24 kilometers per hour or more over a rough road (e.g., Belgian block road) where the occupant is subjected to displacement with respect to the vehicle in both horizontal and vertical directions. Measurements shall be made with the vehicle stopped and the occupant in the normal seated position.

(j) *Emergency-locking retractor.* Three retractors shall be tested in a manner to permit the retraction force to be determined exclusive of the gravitational forces on hardware or webbing being retracted. The webbing shall be fully extended from the retractor passing over or through any hardware or other material specified in the installation instructions. While the webbing is being retracted, the lowest force of retraction within plus or minus 2 inches or 5 centimeters of 75 percent extension (25 percent retraction) shall be determined. The retractor shall be subjected to an acceleration of 0.5 gravity or 5 meters per second per second within a period of 50 milliseconds, while the webbing is at 75 percent extension, and the webbing movement before locking shall be measured under the following conditions: For a retractor sensitive to webbing withdrawal, the retractor shall be accelerated in the direction of webbing withdrawal while oriented horizontally and at angles of 45, 90, 135, and 180 degrees to the horizontal plane. For a retractor sensitive to vehicle acceleration, the retractor shall be accelerated in three directions normal to each other while oriented horizontally and at angles of 45, 90, 135, and 180 degrees to the horizontal plane unless the retractor locks by gravitational force when tilted in any direction to an angle of 45 degrees or more.

(k) *Performance of retractor.* After completion of the corrosion-resistance test described in paragraph (a) of this section, the webbing shall be fully extended and allowed to dry for at least 24 hours under standard laboratory conditions specified in § 9.7(a). The retractor shall be examined for ferrous and nonferrous corrosion which may be transferred, either directly or by means of the webbing, to a person or his clothing during use of a seat belt assembly incorporating the retractor, and for ferrous corrosion on significant surfaces if the retractor is part of the attachment hardware. The webbing shall be withdrawn manually and allowed to retract for 25 cycles. The retractor shall be mounted in an apparatus capable of extending the webbing fully, applying a force of 20 pounds or 9 kilograms at full extension, and allowing the webbing to retract freely and completely. The webbing shall be withdrawn from the retractor and allowed to retract repeatedly in this apparatus until 2,500 cycles are completed. The retractor and webbing shall then be subjected to the temperature resistance test prescribed in paragraph (b) of this section. The retractor shall be subjected to 2,500 additional cycles of webbing withdrawal and retraction. Then, the retractor and webbing shall be subjected to dust in a chamber similar to one illustrated in Figure 8 containing about 2 pounds or 0.9 kilogram of coarse grade dust conforming to the specification given in SAE Recommended Practice, Air Cleaner Test Code—SAE J 726a, published by the Society of Automotive Engineers. The dust shall be agitated every 20 minutes for 5 seconds by compressed air, free of oil and moisture, at a gage pressure of 80±8 pounds per square inch or 5.6±0.6 kilograms per square centimeter entering through an orifice 0.060±0.004 inch or 1.5±0.1 millimeters in diameter. The webbing shall be extended to the top of the chamber and kept extended at all times except that the webbing shall be subjected to 10 cycles of complete retraction and extension within 1 to 2 minutes after each agitation of the dust. At the end of 5 hours, the assembly shall be removed from the chamber. The webbing shall be fully withdrawn from the retractor manually and allowed to retract completely for 25 cycles. An automatic-locking retractor or a nonlocking retractor attached to pelvic restraint shall be subjected to 5,000 additional cycles of webbing withdrawal and retraction. An emergency-locking retractor or a nonlocking retractor attached to upper torso restraint shall be subjected to 45,000 additional cycles of webbing withdrawal and retraction between 50 and 100 percent extension. The locking mechanism of an emergency locking retractor shall be actuated at least 10,000 times within 50 to 100 percent extension of webbing during the 50,000 cycles. At the end of test, compliance of the retractors with applicable requirements in § 9.5 (h), (i), and (j) shall be determined. Three retractors shall be tested for performance.

§ 9.9 Test procedure for assembly performance.

(a) *Type 1 seat belt assembly.* Three complete seat belt assemblies, including webbing, straps, buckles, adjustment and attachment hardware, and retractors, arranged in the form of a loop as shown in Figure 5, shall be tested in the following manner:

(1) The testing machine shall conform to the requirements specified in § 9.7(b). A double-roller block shall be attached to one head of the testing machine. This block shall consist of 2 rollers 4 inches or 10 centimeters in diameter and sufficiently long so that no part of the seat belt assembly touches parts of the

block other than the rollers during test. The rollers shall be mounted on antifriction bearings and spaced 12 inches or 30 centimeters between centers, and shall have sufficient capacity so that there is no brinelling, bending or other distortion of parts which may affect the results. An anchorage bar shall be fastened to the other head of the testing machine.

(2) The attachment hardware furnished with the seat belt assembly shall be attached to the anchorage bar. The anchor points shall be spaced so that the webbing is parallel in the two sides of the loop. The attaching bolts shall be parallel to, or at an angle of 45 or 90 degrees to the webbing, whichever results in an angle nearest to 90 degrees between webbing and attachment hardware except that eye bolts shall be vertical, and attaching bolts or nonthreaded anchorages of a seat belt assembly designed for use in specific models of motor vehicles shall be installed to produce the maximum angle in use indicated by the installation instructions, utilizing special fixtures if necessary to simulate installation in the motor vehicle. Rigid adapters between anchorage bar and attachment hardware shall be used if necessary to locate and orient the adjustment hardware. The adapters shall have a flat support face perpendicular to the threaded hole for the attaching bolt and adequate in area to provide full support for the base of the attachment hardware connected to the webbing. If necessary, a washer shall be used under a swivel plate or other attachment hardware to prevent the webbing from being damaged as the attaching bolt is tightened.

(3) The length of the assembly loop from attaching bolt to attaching bolt shall be adjusted to about 51 inches or 130 centimeters, or as near thereto as possible. A force of 55 pounds or 25 kilograms shall be applied to the loop to remove any slack in webbing at hardware. The force shall be removed and the heads of the testing machine shall be adjusted for an assembly loop between 48 and 50 inches or 122 and 127 centimeters in length. The length of the assembly loop shall then be adjusted by applying a force between 20 and 22 pounds or 9 and 10 kilograms to the free end of the webbing at the buckle, or by the retraction force of an automatic-locking or emergency-locking retractor. A seat belt assembly that cannot be adjusted to this length shall be adjusted as closely as possible. An automatic-locking or emergency-locking retractor when included in a seat belt assembly shall be locked at the start of the test with a tension on the webbing slightly in excess of the retractive force in order to keep the retractor locked. The buckle shall be in a location so that it does not touch the rollers during test, but to facilitate making the buckle release test in § 9.8(d) the buckle should be between the rollers or near a roller in one leg.

(4) The heads of the testing machine shall be separated at a rate between 2 and 4 inches per minute or 5 and 10 centimeters per minute until a force of 5,000±50 pounds or 2,270±20 kilograms is applied to the assembly loop. The extension of the loop shall be determined from measurements of head separation before and after the force is applied. The force shall be decreased to 150±10 pounds or 68±4 kilograms and the buckle release force measured as prescribed in § 9.8(d).

(5) After the buckle is released, the webbing shall be examined for cutting by the hardware. If the yarns are partially or completely severed in a line for a distance of 10 percent or more of the webbing width, the cut webbing shall be tested for breaking strength as specified in § 9.7(b) locating the cut in the free length between grips. If there is insufficient webbing on either side of the cut to make such a test for breaking strength, another seat belt assembly shall be used with the webbing repositioned in the hardware. A tensile force of 2,500±25 pounds or 1,135±10 kilograms shall be applied to the components or a force of 5,000±50 pounds or 2,270±20 kilograms shall be applied to an assembly loop. After the force is removed, the breaking strength of the cut webbing shall be determined as prescribed above.

(6) If a Type 1 seat belt assembly includes an automatic-locking retractor or an emergency-locking retractor, the webbing and retractor shall be subjected to a tensile force of 2,500±25 pounds or 1,135±10 kilograms with the webbing fully extended from the retractor.

(7) If a seat belt assembly has a buckle in which the tongue is capable of inverted insertion, one of the three assemblies shall be tested with the tongue inverted.

(b) Type 2 seat belt assembly. Components of three seat belt assemblies shall be tested in the following manner:

(1) The pelvic restraint between anchorages shall be adjusted to a length between 48 and 50 inches or 122 and 127 centimeters, or as near this length as possible if the design of the pelvic restraint does not permit its adjustment to this length. An automatic-locking or emergency-locking retractor when included in a seat belt assembly shall be locked at the start of the test with a tension on the webbing slightly in excess of the retractive force in order to keep the retractor locked. The attachment hardware shall be oriented to the webbing as specified in paragraph (a)(2) of this section and illustrated in Figure 5. A tensile force of 2,500±25 pounds or 1,135±10 kilograms shall be applied on the components in any convenient manner and the extension between anchorages under this force shall be measured. The force shall be reduced to 75±5 pounds or 34±2 kilograms and the buckle release force measured as prescribed in § 9.8(d).

(2) The components of the upper torso restraint shall be subjected to a tensile force of 1,500±15 pounds or 680±5 kilograms following the procedure prescribed above for testing pelvic restraint and the extension between anchorages under this force shall be measured. If the testing apparatus permits, the pelvic and upper torso restraints may be tested simultaneously. The force shall be reduced to 75±5 pounds or 34±2 kilograms and the buckle release force measured as prescribed in § 9.8(d).

(3) Any component of the seat belt assembly common to both pelvic and upper torso restraint shall be subjected to a tensile force of 3,000±30 pounds or 1,360±15 kilograms.

(4) After the buckle is released in tests of pelvic and upper torso restraints, the webbing shall be examined for cutting by the hardware. If the yarns are partially or completely severed in a line for a distance of 10 percent or more of the webbing width, the cut webbing shall be tested for breaking strength as specified in § 9.7(b) locating the cut in the free length between grips. If there is insufficient webbing on either side of the cut to make such a test for breaking strength, another seat belt assembly shall be used with the webbing repositioned in the hardware. The force applied shall be 2,500±25 pounds or 1,135±10 kilograms for components of pelvic restraint, and 1,500±15 pounds or 680±5 kilograms for components of upper torso restraint. After the force is removed, the breaking strength of the cut webbing shall be determined as prescribed above.

(5) If a Type 2 seat belt assembly includes an automatic-locking retractor or an emergency-locking retractor, the webbing and retractor shall be subjected to a tensile force of 2,500±25 pounds or 1,135±10 kilograms with the webbing fully extended from the retractor, or to a tensile force of 1,500±15 pounds or 680±5 kilograms with the webbing fully extended from the retractor if the design of the assembly permits only upper torso restraint forces on the retractor.

(6) If a seat belt assembly has a buckle in which the tongue is capable of inverted insertion, one of the three assemblies shall be tested with the tongue inverted.

(c) Type 3 seat belt assembly. Three seat belt assemblies including webbing, straps, buckles, adjustment and attachment hardware and retractors shall be tested in the following manner:

(1) The testing machine shall conform to the requirements specified in § 9.7(b). A torso having the dimensions shown in Figure 6 shall be attached to one head of the testing machine through a universal joint which is guided in essentially a frictionless manner to minimize lateral forces on the testing machine. An anchorage and simulated seat back shall be attached to the other head as shown in Figure 7.

(2) Attachement hardware for an assembly having single webbing connection shall be fastened at the anchor hole shown in Figure 7 which is centered along the length of the anchorage bar. Attachment hardware for an assembly having two webbing connectors shall be fastened at anchor holes 16 inches or 40 centimeters apart on the anchorage bar, equidistant from the center. Attachment hardware for an assembly

whose design precludes such attachment shall be fastened in accordance with the installation instructions. The back of the torso shall be positioned in a plane parallel to and at a distance of 4 inches or 10 centimeters from the plane of the simulated seat back. The seat belt assembly shall be installed on the torso in accordance with installation instructions and the webbing to the attachment hardware shall be adjusted with effectively no slack. The heads of the testing machine shall be separated at a rate of between 2 and 4 inches per minute or 5 and 10 centimeters per minute until a force of 2,000 pounds or 900 kilograms is applied. The extension of the seat belt assembly shall be determined from measurement of head separation in the testing machine before and after the force is applied. The force shall be reduced to 45±5 pounds or 20±2 kilograms and the release force of the buckle or buckles measured as prescribed in § 9.8(d). A seat back retainer not connected to pelvic or upper torso restraint shall be subjected separately to a force of 2,000 pounds or 900 kilograms.

(3) After the buckle is released, the webbing shall be examined for cutting by the hardware. If the yarns are partially or completely severed in a line for a distance of 10 percent or more of the webbing width, the cut webbing shall be tested for breaking strength as specified in § 9.7(b) locating the cut in the free length between grips. If there is insufficient webbing on either side of the cut to make such a test for breaking strength, another seat belt assembly shall be used with the webbing repositioned in the hardware. A tensile force shall be applied to the components as follows: Webbing in pelvic or upper torso restraint—700±7 pounds or 320±3 kilograms; webbing in seat back retainer or webbing connecting pelvic and upper torso restraint to attachment hardware—1,500±15 pounds or 680±7 kilograms. After the force is removed, the breaking strength of the cut webbing shall be determined as prescribed above.

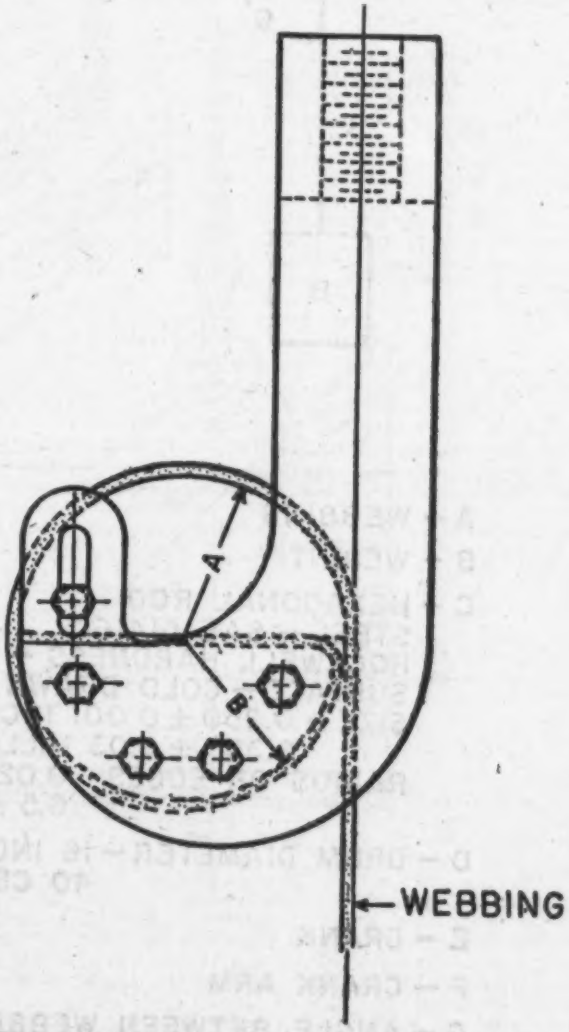
(4) If a seat belt assembly has a buckle in which the tongue is capable of inverted insertion, one of the three assemblies shall be tested with the tongue inverted.

§ 9.10 Provision for changes in the standards.

Section 4 of the act provides for the possibility of changes in the standards first established pursuant to section 1 of this act. Any person, firm or organization wishing to propose a change in these standards shall submit the detailed proposal to the Director, National Bureau of Standards, U.S. Department of Commerce, Washington, D.C. 20234.

§ 9.11 Effective date.

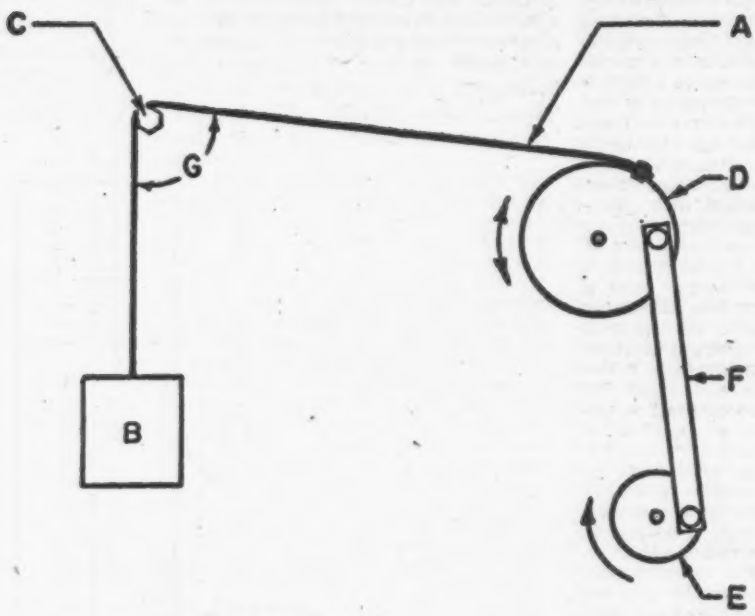
The standards prescribed herein shall become mandatory after February 28, 1967, and until this date shall be optional alternatives to the standards published in the FEDERAL REGISTER on July 1, 1965.



A 1 TO 2 INCHES OR 2.5 TO 5 CENTIMETERS

B A MINUS 0.06 INCH OR 0.15 CENTIMETER

FIGURE 1.



A – WEBBING

B – WEIGHT

C – HEXAGONAL ROD
STEEL – SAE 51416
ROCKWELL HARDNESS – B-97 TO B-101
SURFACE – COLD DRAWN FINISH
SIZE – 0.250 ± 0.001 INCH OR
6.35 ± 0.03 MILLIMETER
RADIUS ON EDGES – 0.020 ± 0.004 INCH OR
0.5 ± 0.1 MILLIMETER

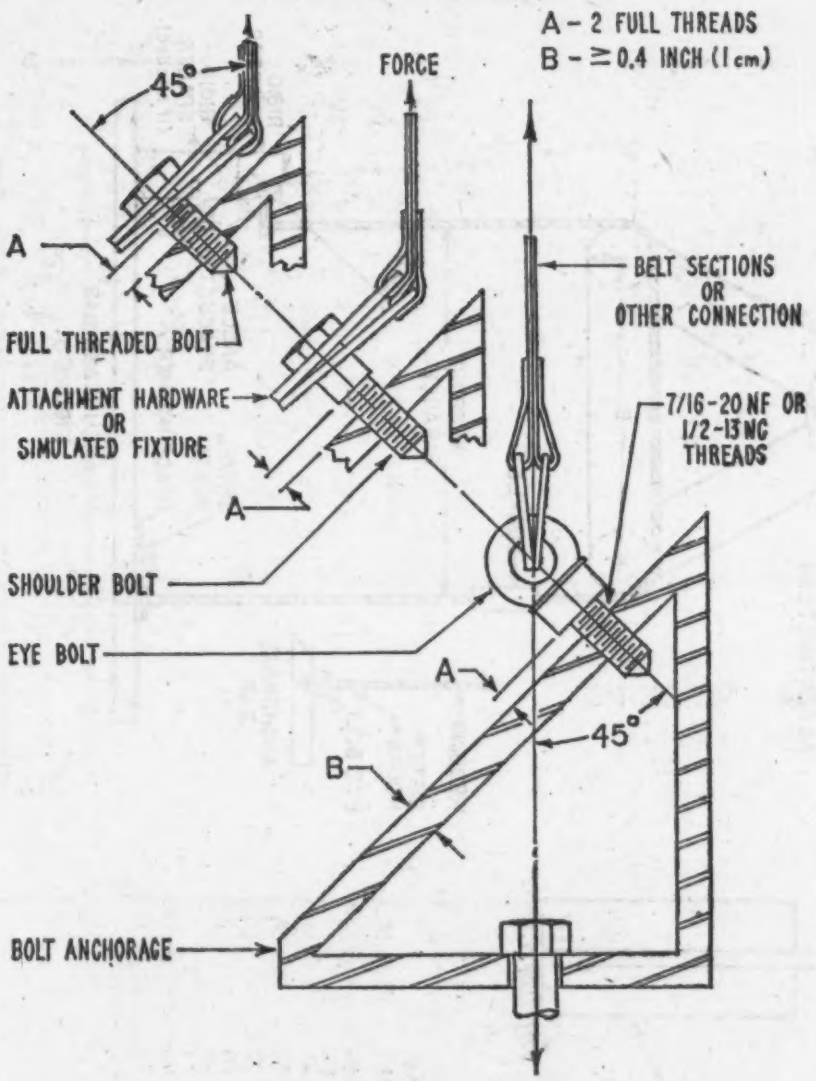
D – DRUM DIAMETER – 16 INCHES OR
40 CENTIMETERS

E – CRANK

F – CRANK ARM

G – ANGLE BETWEEN WEBBING – 85 ± 2 DEGS.

FIGURE 2


A – 2 FULL THREADS
B – ≥ 0.4 INCH (1 cm)
FORCE
45°
A
FULL THREADED BOLT
ATTACHMENT HARDWARE OR SIMULATED FIXTURE
A
BELT SECTIONS OR OTHER CONNECTION
7/16-20 NF OR 1/2-13 NC THREADS
SHOULDER BOLT
EYE BOLT
A
45°
B
BOLT ANCHORAGE

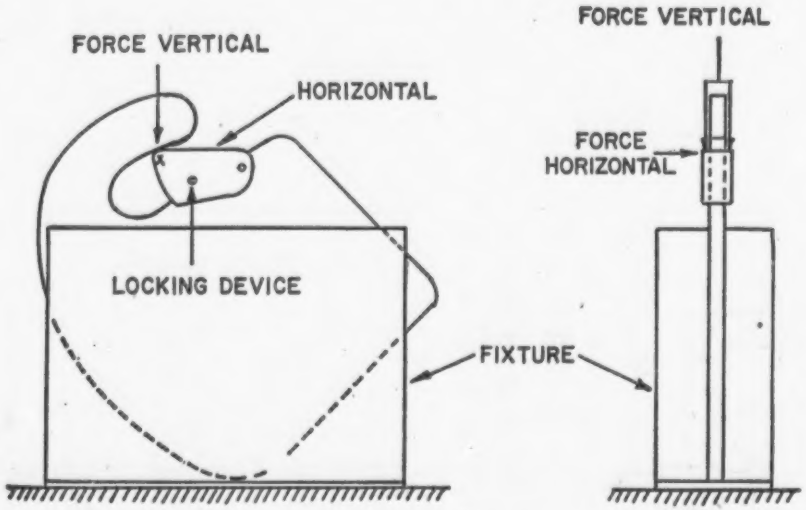
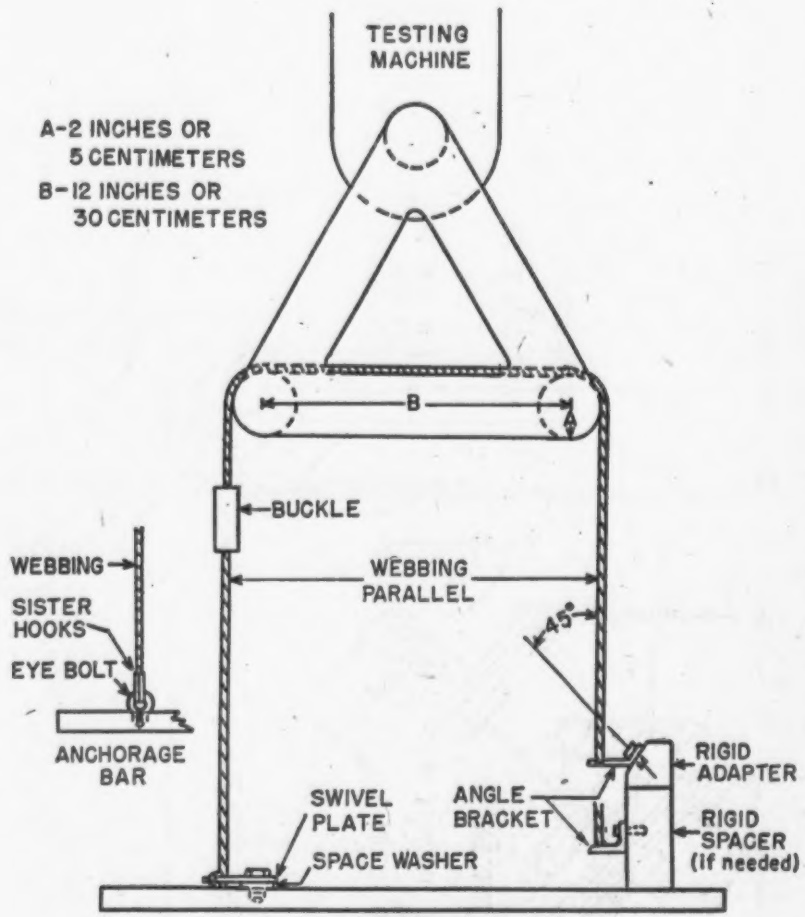
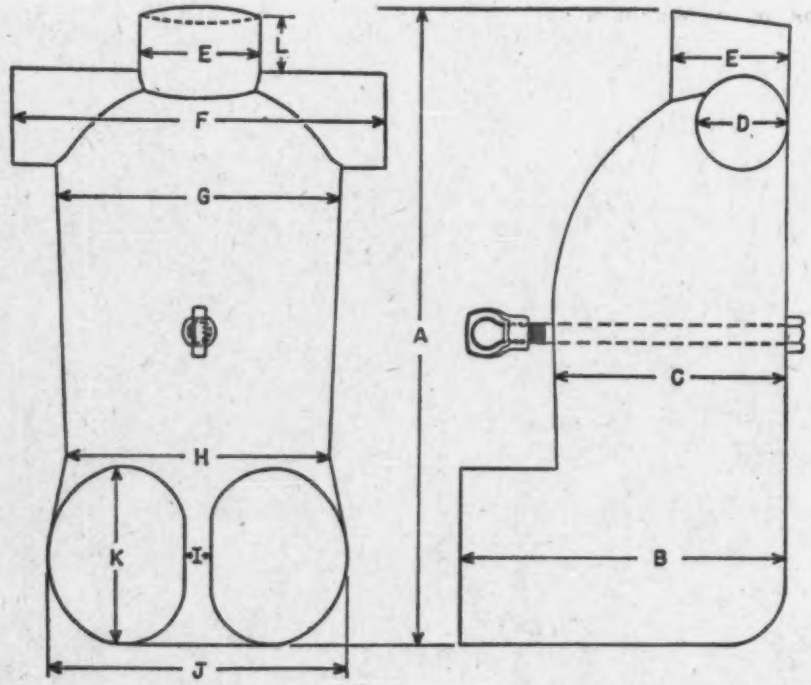


FIGURE 4
SINGLE ATTACHMENT HOOK

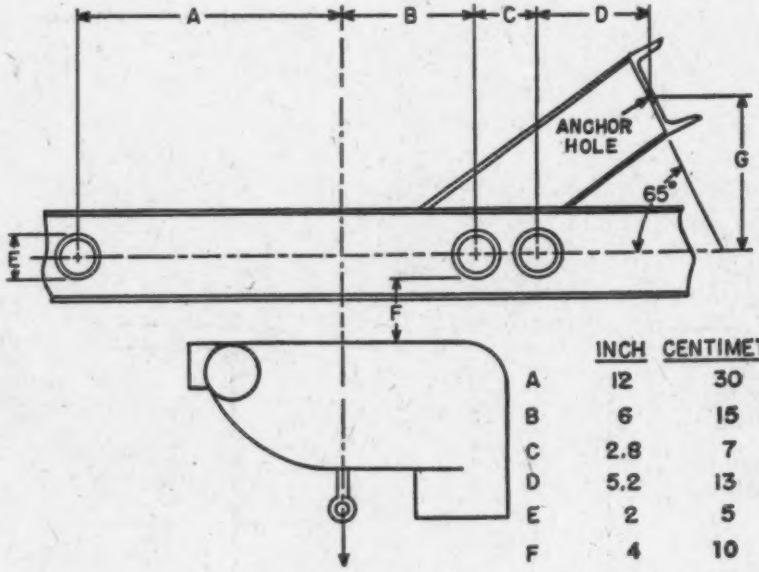


ANCHORAGE BAR
FIGURE 5.



	A	B	C	D	E	F	G	H	I	J	K	L
INCH	15	8	5.8	2.3	2.9	9	6.8	6.4	0.6	7.3	4.2	1.3
CENTIMETER	38	20	14.5	5.8	7.3	23	17	16	1.5	18.5	10.7	3.3

FIGURE 6.



	INCH	CENTIMETER
A	12	30
B	6	15
C	2.8	7
D	5.2	13
E	2	5
F	4	10
G	7	18

FIGURE 7.

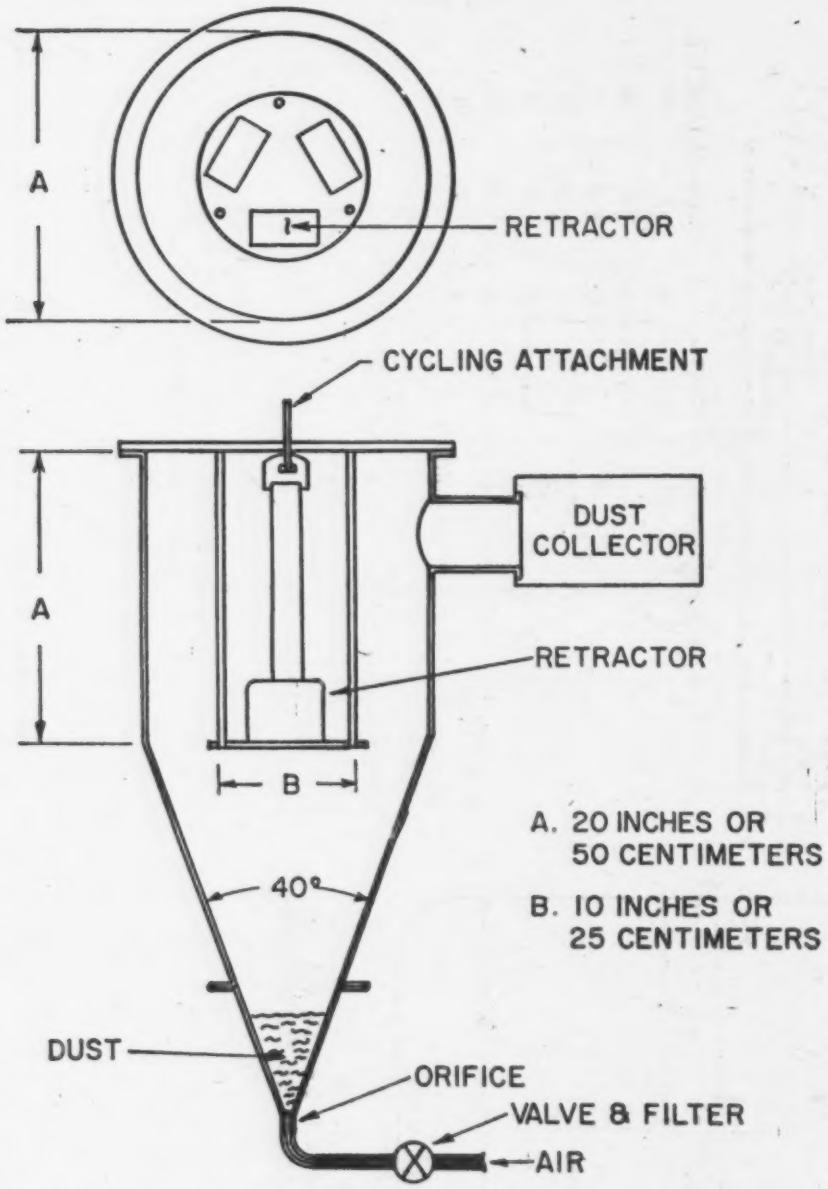


FIGURE 8.

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